WHAT IS CLAIMED IS:

SUB C1

1. A system for sensing alternator current levels, the combination comprising:

an operational amplifier having an input and an output;

an input resistor connecting the input to a signal indicative of an alternator current level;

a feedback resistor connected between the input and the output;

an adjustment resistor and a switching element coupled in series between the input and the output, in parallel with the feedback resistor; and

a processor coupled to the output and being operable, based upon a current indication related to a level of alternator current indicated at the output, to control the operation of the switching element such that the switching element is closed when the current indication increases to exceed a first threshold, and such that the switching element is opened when the current indication decreases to fall below a second threshold.

2. The system of claim 1, wherein the switching element is at least one of a field effect transistor, a metal oxide semiconductor field effect transistor, and a bipolar junction transistor.

3. The system of claim 1, wherein the first threshold is 93% of a lower scale range, and the second threshold is 10% of a higher scale range.

4. The system of claim 1, wherein the processor determines the current indication using a formula, and wherein the formula includes a first multiplicative factor when the switching element is on, and includes a second multiplicative factor when the switching element is off.

5. The system of claim 1, wherein a gain of the alternator increases by a factor of ten when the switching element is switched off.

6. The system of claim 1, wherein the level at the output is converted from an analog signal to a digital signal by an analog-to-digital converter before being provided to the processor.

7. The system of claim 1, further comprising a current transformer that is capable of being coupled to the alternator and providing the signal that is indicative of the alternator current level to the input resistor.

8. The system of claim 1, wherein the level at the output is at least one of a current and a voltage, and wherein the signal provided to the input resistor is at least one of a current and a voltage.

9. The system of claim 1, wherein the current indication is used to determine whether the alternator is potentially being exposed to excessive current and heat.

SUB B1

10. The system of claim 1, wherein the operational amplifier includes an additional input, and further comprising:

an additional input resistor coupled to the additional input, and;

coupled between a voltage source and the additional input, an additional feedback resistor coupled in parallel with a combination of an additional adjustment resistor and an additional switching element.

SUB B, cncl'd.

11. A system for accurately sensing current levels within an alternator, the system comprising:

an amplification means for amplifying or reducing a first signal indicative of a current level within the alternator to produce a second signal indicative of the current level;

a modification means for adjusting the level of amplification or reduction of the amplification means; and

a processing means for controlling the modification means and for processing at least one of the second signal and a third signal based upon the second signal to determine a current measurement value.

12. The system of claim 11, further comprising a current transformation means for receiving a fourth signal indicative of the current level within the alternator from the alternator and providing the first signal in response thereto.

13. The system of claim 11, wherein the processing means causes the modification means to step down a gain of the amplification means when the current measurement value exceeds a first threshold, and the processing means causes the modification means to step up the gain of the amplification means when the current measurement value falls below the first threshold.

14. A method of accurately sensing current levels within an alternator, the method comprising:

providing a differential amplifier configured to receive a first indication of a current level within the alternator at a first input port and to provide a second indication of the current level at an output port;

providing a processor in communication with a switching element of the differential amplifier and the output port;

receiving the first indication of the current level;

determining at the processor at least two measured current values based upon the second indication;

switching a status of the switching element to reduce a gain of the differential amplifier when the measured current values increase from being below a first threshold to exceed the first threshold; and

switching the status of the switching element to increase the gain of the differential amplifier when the measured current values fall from above a second threshold to below the second threshold.

15. The method of claim 14, further comprising:

changing a multiplicative factor within a formula used by a software routine of the processor to calculate the measured current values based upon the second indication when a status of the switching element is switched.

16. The method of claim 14, wherein when the switching element is switched off, a gain of the differential amplifier is at least one of increased and decreased by a factor of 10.

17. The method of claim 14, wherein the differential amplifier includes, between the first input port and the output port, at least one of a series combination of an adjustment resistor and the switching element in parallel with a feedback resistor, and a parallel combination of an adjustment resistor and the switching element in series with the feedback resistor.

18. The method of claim 14, wherein the first threshold is 93% of a lower scale range, and the second threshold is 10% of a higher scale range.

19. The method of claim 14, further comprising providing a current transformer which receives a current signal from the alternator and provides the first indication in response thereto.

20. The method of claim 14, further comprising converting the second indication from an analog signal to a digital signal by way of an analog-to-digital converter before it is utilized by the processor to determine the measured current values.

21. The method of claim 14, further comprising determining based upon the measured current values whether the alternator is potentially being exposed to excessive current and heat.